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A Case Study of Bells University Undergraduate Studio for the Evaluation of Spatial Ergonomics in Architectural Studio and the Impact on Student Performance

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Abstract
An important factor in the spatial ergonomics of a workplace is the interaction between the physical environment and human behaviour. To further support studio culture and aid in student performance, design studios in Nigerian educational institutions must be well balanced in terms of comfort and functionality. This study examined the psychological relationships between workplace ergonomics and their potential beneficial or negative effects on users, depending on how successfully ergonomic and spatial design principles were used. In this study, comfort and practicality are properly balanced in an architectural design office by combining ergonomic and interior design principles. In order to assess the state and calibre of the adopted design studios and learn how it affected the students' performance on the job, a survey of undergraduate architecture students at The Bells University of Technology was conducted. The findings were collated, presented in an understandable manner, and explained to support the hypothesis that the institution's design studios fall short of expectations. Based on the responses from the respondents, this study also makes suggestions for how to raise the standard of design studios and so elevate studio culture.

Keywords: Psychology, principles, built environment, research, survey, results.

Introduction

Numerous Nigerian colleges' architectural departments have collectively housed thousands of students, and they all share a common struggle provided the resources and necessary means to help and lessen the strain of students wishing to enrol in the course. This could be due to factors like geography, money, or even the fact that relatively few students applied for the course at particular periods, which led those in charge to decide the expenses were not warranted given the limited number of applicants (strategy to save cost). Additionally, even in settings when the most of these necessities are met, there are still instances of students failing, which, in my opinion, is directly related to the immediate learning environment to which they are exposed.

According to (Z. Akbarzadeh, 2020), The environment has a significant influence in enhancing students' learning and development. Achieving educational goals necessitates a suitable setting to foster relevant behaviours. They listed the classroom layout as one of the environmental capacities.

Due to the massive and demanding workload assigned to students enrolled in architecture programmes, an architecture student spends at least 60% or more of his or her time working in the design studio. Because students spend so much time in the studio, which is frequently referred to as their "second home," architecture is a tremendously competitive and demanding field. The design studio is where students are encouraged to express their creativity in their work, where they collaborate to solve architectural problems, where they stay up late to finish projects on time (if permitted by their respective institutions), and where they are expected to enjoy themselves while working on various projects. For students to feel at ease working for the school, it is a sacred area.

In Human Psychology, Ergonomics is an Extension of Interior Design

“Since we spend the majority of our time indoors, our surroundings have a significant impact on how we behave psychologically. Environmental psychology, often known as

space psychology, is the study of how humans interact with the environments they live in. Lighting, colours, configuration, scale, proportions, acoustics, and materials all have unique effects on how an individual feels and behaves through appealing to their senses and evoking a range of emotions. Space can have a significant impact on how we act or feel, from feeling at home warm, safe, and comfortable to creating an effective and positive work environment. For this reason, design and creative measures should be taken into account in accordance with the social and psychological needs of the occupants."

"The study of human relations and behaviours in the context of the built and natural surroundings, according to (Kopec, 2018) [4], a specialist in the subject and a professor at the new school of Architecture and Design in San Diego. Interior design has become a crucial component of people's psychology since it directly affects your subconscious, influences your emotions, and shapes your perceptions through that unique area of your brain that responds to the geometry of the place you occupy. Interior space has significant effects, even if it is not the only aspect at play. It is the architect's job to design practical user solutions and incorporate these concepts into the building."

"It is possible to balance comfort and working circumstances by ergonomically implementing all of these elements in a workspace like a design studio."

A Good Day at the Architectural Studio

According to (Shaqour, 2021) [5], in order to create flexible architectural studios, criteria and unique student demands must be taken into account in both traditional and digital architecture studios. Students should have a private, interactive place in the design studio. Unfortunately, as was already mentioned, design studios prioritise cost over all else, which results in office-like arrangements without taking into account the psychological effects on the students using the space. The office-like design makes the space less participatory and makes it harder for kids to be as creative as needed. The Bells University of Technology's undergraduate design studios (100 level to 400 level) are comparable. aside from Since undergraduate studios do not have a separate building, they must also share space with other departments, which has its own set of drawbacks. They have an office-like layout and, in the case of students, have grown monotonous over time. The areas are crowded with as many drafting tables as they can fit into the spaces with as little navigation room as possible, not taking into account the necessary measurements to account for each drafting table per student. This issue, among many others, can make it extremely difficult and uncomfortable for students to work in the studio. Most of the time, it also reduces the possibility of privacy in the working environment.

According to (Shaqour, 2021) [5], there are three main factors that can develop the most suitable design solution for a sustainable design studio. They are

1. Having a transformable private and personal space.
2. Multifunctional interactive space.
3. Lovable natural setting.

The picture above shows how a well-spaced studio should always look. Every drawing table should have about 1500-1600m of space in order for students to work comfortably. It can also be observed from the picture that the studio is not over congested and there is maximum navigational space in between every row. Although, this example makes use of an office like layout, the same principles can be applied to any form of arrangement in the design studio, be it a semi-circular arc or an arrangement with both sides of the desks facing each other.

Essential Ergonomics Principles and Applications in the Studio

According to Sheprak (2021) [6] working when standing or sitting requires the right use of ten principles that can be used to improve the ergonomics of any workspace. When implemented in the workplace, at home, in the automobile, and while travelling, these small adjustments can have a significant positive impact on your general wellbeing. The 10 ergonomic principles and how they might be used in studio design are listed below.

1. **Work in a Neutral Position:** It's crucial to maintain a neutral posture throughout the day when working. This specific concept frequently has an impact on a number of bodily parts. Body regions that are susceptible to stress from poor posture brought on by poorly sized office furniture include the back, foot, neck, elbows, and wrists. This is also true of studios; given that architecture students frequently spend extended periods of time working in them, studio equipment should be made to accommodate students for extended periods of time.
2. **Lessen the Requirement for Excessive Force:** Moving something with your entire weight is unproductive, especially if your job requires endurance. This rule entails avoiding tugging, pushing, and lifting heavy objects that could put undue strain on the joints. The potential for tiredness or injury is increased by this. It is preferable to find methods and strategies that can lighten the load that needs to be moved rather than using force. Perhaps it's a cart. This applies to the design studio, where there are cart-type tables for bringing in displays like laptops for audiovisual lessons, as well as on days like judging.
3. **Keep Supplies Close at Hand:** When working, you should keep tools you use regularly close to your workspace. You might need to modify your space so you aren't reaching for regularly used items in order to accommodate your reach envelope. According to the students, this must be taken into account in the design space. Every student needs their own place to work effectively; yet, if the studio is overcrowded with little room for movement, this cannot be possible. A good way to guarantee that each student has enough workspace is to restrict the number of drawing tables to their exact capacity.
4. **Work at the Proper Height:** Having a work surface that is too high or too low can strain the back, neck, back and shoulders. Most routine work should be done at elbow height whether you are sitting or standing. This is also important to apply in the work place of a student in the design studio. The drawing table should be well scaled to an average height for each student and the benches should all be scaled exactly the same. Working on a table that's too high for a bench can cause much strain for a student and hinder a comfortable working environment which can in turn affect the quality of work being done, instead of the student to focus on quality work in that situation, the student would be focusing as fast as possible.
5. **Reduce Needless Motions:** Excessive repetition can result in overuse injuries. Consider the actions you

perform repeatedly throughout the day and look for methods to cut back. For instance, in a design studio, you can place your portfolio by the side of your table rather than turning around every time you need to access it. However, this is only viable if your workspace is well-arranged and spread out. Additionally, you can organise your workspace specifically to suit your working style.

Conclusion

Through the use of user-assimilated data, this study illustrated how to effectively build and organise sufficient design studio spaces.

This study promotes the use of behavioural sciences and its use into studio space planning.

It is crucial that we take into account factors that make a design studio habitable and bearable for students and apply them as best we can when planning such spaces to ensure the comfort of students, which in turn promotes studio culture. The design of a design studio can suffer from a lack of knowledge or disregard for human behaviours, attitudes, and values.

Understanding the interaction between people and the environment is crucial to the creative process of architecture. This kind of research should be supported, particularly in the area of architectural education.

Following the research, the following conclusions were made:

Students' psychological responses to the physical features of the architectural design studio have both positive and negative consequences, which can have both direct and indirect effects. Their academic success throughout their courses. If the right efforts are done to build the studios so that all requirements are met, it might have a favourable impact on students' cognitive capacities, which in turn could guarantee an increase in improved academic performance. Bells University of Technology and other institutions' studio conditions require significant improvement, and the administration must interact with students to make sure they are following the appropriate course.

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